

## **ESF/SCH Exploratory Workshop**

### **Reconstructing Science: Contributions to the Enhancement of European Scientific Heritage**

#### **Executive report** **And Assessment of the results**

Marco Beretta  
(Università di Bologna)

In June 8-9, 2001 an Exploratory workshop, promoted by the European Science Foundation<sup>1</sup>, was held in Ravenna in order to compare different approaches to the enhancement of the European scientific heritage. The rich variety of projects presented and the lively discussions which have alimanted its final success are the object of the scientific report.

One of the most distinctive features of the history of science, on which probably everybody involved in this field would agree, is that unlike other forms of history it deals with many different classes of three dimensional objects. Instruments, natural specimens and collections, spaces such as laboratories and natural fields complement and at time determine the intellectual horizon of most of scientific disciplines. For any one interested in the documentary history of science it soon becomes obvious in fact that the documents we have to deal with are extremely varied. This interesting interaction between the intellectual creativity and the material evolution of its environment is extremely difficult to study when it comes to concretely examine the historical sources.

During two days of intense and lively discussion the participants shared the conviction that European scientific Heritage has yet to be fully explored and that the growing importance of science in our society offers an opportunity and, at same time, it impose a duty to explore new possibilities to enhance the rich patrimony which we own.

---

<sup>1</sup> The workshop, organised by the present writer, was also promoted by the Centro Interdisciplinare di Ricerca in Epistemologia e Storia delle Scienze "Federigo Enriques" and the Facoltà di Conservazione dei Beni Culturali of the University of Bologna.

The participants provided numerous examples of different approaches to scientific heritage and the application of new technology has been at the centre of most of presentation.

Three general themes emerged throughout the workshop.

1. the central role of science museums in coordinating actions in enhancing the heritage;
2. the role played by new technologies in favoring research of new approaches to the handling of the sources of history of science and technology
3. the search for common exchange standard through which information can be communicated within the www.

The assessment of the results obtained by the workshop was unanimously positive and the interdisciplinary nature of the discussion which followed each presentations enriched the scientific quality of the debate. In order not to disperse the usefulness of this pioneering exchange I was invited by the participants to publish a report of the workshop (which has been completed and will be indeed published in the International journal of history of science *Nuncius* by the beginning of 2002). Also the contribution on the Russian scientific heritage will be published in the nearest future in *Nuncius*. Furthermore all participants agree that a further deepening of many of the particular topics surveyed at the workshop was urgently needed and, to this aim, an informal committee was established in order to envisage the possibility to create a European network on scientific heritage and to apply for further funds to the ESF.

## Scientific report

Marco Beretta  
(Università di Bologna)

Antonio Garcia Belmar (Universidad de Alicante) has opened the workshop by presenting a catalogue of scientific instruments and artifacts belonging to the University of Valencia. The instrument catalogue on digital support (a CD-rom was presented) are about 1000 and they pertain very heterogeneous collections built mostly during the 19<sup>th</sup> century by academic physicists, chemists and astronomers.

The main problem dealing with such a variety of artifacts is their historical classification. Scientific instruments in fact had different destinations and public. Some were used for teaching purposes, other for performing experimental or industrial research. An adequate enhancement and classification of this heritage must therefore take these differences and contexts into consideration. To this aim, it is also important to bring together different expertise and create a collaborative unit in which the historian of science can collaborate with the scientist, the teacher and the museum curator.

Another project, similar in nature and carried out in co-operation with the group in Valencia, has been launched at the University of Barcelona.

Jim Bennet, (Oxford Museum of History of Science) presented two different projects on scientific instruments which shows two completely different but in some way complementary uses of data-base technology. The first was the Epact project ([www.mhs.ox.ac.uk/epact/](http://www.mhs.ox.ac.uk/epact/)) which is "an electronic catalogue of medieval and renaissance scientific instruments from four European Museums: the Museum of the History of Science, Oxford, the Istituto e Museo di Storia della Scienza, Florence, the British Museum, London and the Museum Boerhaave, Leiden. Together, these museums house the finest collections of early scientific instruments in the world." Epact consists 520 catalogue entries each providing one or more digital images of the instrument and a description of it. "Supporting material of the catalogue entries include a thematic essay providing background information about the medieval and renaissance arts and sciences as well as a number of technical articles giving explanations on how different types of instrument operate."

A second more recent project presented by Jim Bennet was the Online Register of scientific Instrument (<http://www.isin.org/>). The Online Register of Scientific Instruments is an international database of historic scientific instruments and related objects available via the Internet. It is developed and supported by the Museum of History of Science in Oxford in association with the Scientific Instrument Commission of the International Union of the History and Philosophy of Science.

"The primary purpose of the Online Register is to provide an efficient, centralised, widely available register of historic scientific instruments and related objects that exist in dispersed collections of all kinds from around the globe. It is analogous to a computerised library catalogue in that it holds only a limited amount of key information about each instrument: the information most commonly used to allow an instrument to be located. It does not contain any detailed information about an instrument's form, use, or history. It is a gateway only - a stepping-off point to more extensive information that will be held by institutions themselves, whether on-line or off-line.

As in a computerised library catalogue, visitors to the Online Register can search through the key indexes of the register for certain keywords, phrases, or any other text pattern. In addition, visitors may browse through any of the available indexes alphabetically.

The instrument entries are not ratified or policed in any way by the maintainers of the Register. There are no prescriptive rules about the headings that must be used for particular types of instruments, for example, or about the correct form in which to give any names. Neither are there any rules about how much information must be provided for each instrument, or about what language it must be provided in. Nor is any guarantee given about the accuracy of the information that is provided. Instruments may, for example, be registered in each index under multiple terms. Thus, a single instrument may appear in the Headings index under a number of different headings, may be indexed under a number of different Associated Names, and may be referenced under a number of different Associated Places, or under the same place given in different forms. Any field except for the Instrument Heading and ISIN number may also be left blank. Responsibility for the content rests with the contributors."

Mara Miniati (Istituto e Museo di Storia della Scienza, Florence) also presented two projects related to the enhancement of scientific instrument collections. The first, SIC (Scientific Instruments Catalogue) represents an card-index exchange format for the classification of scientific instruments. The card-index is intended to provide a catalogue of scientific instruments of historical interest, of discoveries of industrial archaeology and of the apparatus of bygone days. "The card-index is intended as the centre of an information system and can be linked with various archives and databases. This means that, as well as being an instrument with which to combine results of study and research, it is also a point of departure for further research and investigation.

The card-index, produced within the framework of the Strategic Project of the CNR on scientific museography, permits different levels of cataloguing and is in agreement with the proposals of the Central Institute for Catalogues and Documentation (ICCD) of the Italian Ministry of Cultural Heritage, especially with regard to the Artistic Object (OA) index cards. The permitted levels of cataloguing are: Inventory cards, First Cataloguing cards and Cataloguing cards. The last mentioned are often the result of lengthy research and may be completed as a result of years of work and require links with other cards. Each level of cataloguing involves the compilation of several index-terms on the card which complete the pre-established level.

In every case, in accordance with the requirements of the instrument and the choice of the compiler, more than one card may be compiled for the same instrument, corresponding to the component parts of the instrument, to its attachments and accessories. The card-index is perceived, then, as a flexible tool, modifiable according to the cataloguing requirements of very different instruments and also with respect to developments and changes required by new studies and later extensions. Additionally, SIC is not a new programme written by the Museum of History of Science but an exchange format. In other words it is a type of cataloguing schema which can be used with any software.

SIC card-index is suitable for numerous different purposes. It can permit simple printed formats, of the dimensions required under different circumstances. For example. one can print the card in the form of a caption which labels the objects on display, or as a descriptive card for a general catalogue intended for a general public, or as a sanitary card, necessary, at least in Italy, to send an instrument to a temporary exhibition.

We can obtain different orderings of the information, according to the demands and chronological focus of the case at hand, by type of instrument, by artisan or whatever ordering is desired by the user.

The floppy disk containing SIC is distributed by the Museum which is making every effort, including the present translation of the Manual into English, to ensure the widest possible distribution”.

Following the success of SIC, the Institute and Museum of History of Science managed to get the cataloguing format, now called STS (Strumenti Scientifici) in its developed form, recognised as a standard by the Italian Ministry of Cultural Heritage([www.iccd.beniculturali.it](http://www.iccd.beniculturali.it)). The importance of this achievement is underlined by the fact that for the first time scientific heritage in general and scientific instruments in particular have been fully recognised as an integral part of cultural heritage and their enhancement is regulated by law. This recognition is of crucial importance in order to develop new professional figures to be engaged into the preservation, restoration and enhancement of scientific heritage.

Svante Lindqvist (Nobel Museum, Stockholm) presented the opening the Nobel Centennial exhibition in Stockholm (April, 2001) which was promoted by the Nobel Foundation in order to mark the 100<sup>th</sup> anniversary of the Nobel Prize. The theme of the exhibition is: “What is creativity and how can creative activity best be encouraged? Which is more important to the creative process: the individual or the environment?” The exhibition provides the users with itineraries which help to find answers to this questions. The Nobel Museum, which was founded in 1988 and has not yet found a permanent site, has challenged the curator indeed because of the difficulty to built up an exhibition on creativity and essentially without any availability of other artefacts than the prizes themselves. Apart from the Centennial exhibition, the Nobel Museum offers a rich variety of historical itinerary on-line at its web-site [www.nobel.se](http://www.nobel.se). As much as Lindqvist recognised the importance of the use of new technologies in the enhancement of scientific heritage, he warned that an uncritical use of them might favour an excuse to create a sort virtual preservation which justify the destruction of real things. The ongoing debate on the destruction of journals and series in many US libraries after they have been microfilmed was taken as an example of this danger.

Irina Gouzevitch (Centre Alexandre Koyré, Paris) and Boris Kozlov (Archives of the Russian Academy of Sciences, Moscow) have surveyed the complex history of the Academy of Sciences of St. Petersburg. Its archive have been parted in two main sections: the archive of the scientific activities of the Soviet period and the old archive. The first is now preserved in Moscow while the old archive, the object of Gouzevitch's and Kozlov's presentation, is preserved in the old building of the Academy of Sciences at St. Petersburg. Although historians of science have so far made little use of this source, the archive of the Academy of Sciences of St. Petersburg contains extremely valuable and hitherto unknown documents dealing with the history of European science. Furthermore the archive is relatively well ordered and classified into personal funds, official correspondence, expeditions' reports (such as the report on the expedition to Siberia during the period 1733-1743). Half of the heritage preserved at the archive is directly or indirectly connected with European science. Another section of the scientific collection preserved at the Academy of St. Petersburg is represented by the curiosity cabinet which includes among its holdings some natural specimens coming from the collection of the Dutch physiologist F. Ruysch, and the museum which includes parts of Lomonosov's instruments. The archive and the museum are complemented by a rich library which hosts the largest collection of scientific books in Russia.

Ulf Hashagen (Deutsches Museum, Munich) has surveyed some of the most recent projects promoted in Germany for the enhancement of the Scientific Heritage. The first is the Jahrbuch project, JFM (<http://www.emis.de/MATH/JFM/JFM.html>) for the creation of a mathematical archive. "JFM Project is to create a digital library for classical mathematics in the World Wide Web. It consists of a complete electronic catalogue of the mathematical publications in the time period between 1868 - 1942 (JFM database) and a digital archive storing the most relevant publications from that period. The two components are linked very closely.

The JFM Project is sponsored by the [Deutsche Forschungsgemeinschaft \(DFG\)](#). Therefore the JFM Project will be a free service for the mathematical community worldwide, as far as costs resulting from the installation of the system will be concerned."

The second project, Jordanus (<http://jordanus.ign.uni-muenchen.de/cgi-bin/iccmsm-form.pl?sprache=en>), is an International catalogue of medieval mathematical. "There are an estimated 30,000 to 35,000 mediaeval western "scientific" manuscripts scattered throughout the world. Many attempts have been made to catalogue them, from the early seventeenth century hand-written catalogues to the present-day printed catalogues. Even the most recent catalogues, however, cannot be updated or corrected at a reasonable cost. A computerized catalogue, on the other hand, can be updated, corrected, printed and made available to a wide range of users at any time and at low cost.

Jordanus, is now made available by the Institute for the History of Science at the University of Munich and by the Max Planck Institute for the History of Science in Berlin.

The database is accessible on the internet by any current net browser. It provides information about mediaeval manuscripts written in Western Europe between 500 and 1500 A.D. which treat the mathematical sciences in the wider sense, i.e. arithmetic, algebra, geometry, trigonometry and mechanics."

The project on an Early Modern History Server (<http://www.sfn.uni-muenchen.de/>) was also presented. The Server's interdisciplinary section features the scholarly publications service (offering an overview of books on early modern history newly available at the BSB and of recent articles in scholarly journals) as well as three online review journals. You will also find information on current research projects as well as regular reviews of interesting websites.

"The servers content-based section explores ways of publishing and presenting historical research on the internet, highlighting single topics of particular interest for early modern historiography. For example, an on line dictionary on the history of the witch hunt is currently being compiled."

Hashagen also presented the ongoing electronic edition of the German physicist Arnold Sommerfeld's scientific correspondence which has been published at the website:

[http://www.lrz-muenchen.de/~Sommerfeld/WWW/AS\\_Suche.html](http://www.lrz-muenchen.de/~Sommerfeld/WWW/AS_Suche.html)

Last but not least, Hashagen announced the forthcoming publication by the Center for history of science at the Deutsches Museum of a portal of history of science and technology (supported by the DFG) a project which aims at providing information service, digitalization of resources and a community server.



Rob Iliffe (Imperial College, London) and Scott Mandelbrote (All Souls College, Oxford) has presented the Newton project (<http://www.newtonproject.ic.ac.uk>). "Isaac Newton (1642-1727) is universally acknowledged as one of the two or three most influential scientists in history. In his *Principia Mathematica* of 1687 he announced three laws of motion and the concepts of mass, force and Universal Gravitation. In his *Opticks* of 1704 he showed that white light was heterogeneously composed of more basic, primary rays, each with its own specific colour and index of refraction. Apart from these achievements in physics, Newton's mathematical prowess was extraordinary, and with Gottfried Leibniz he was one of the two inventors of the calculus.

Although these achievements are fundamental to modern mathematics and physics, it is less well known that Newton himself placed great value on his private researches into theology and alchemy. Interest in the wealth of surviving manuscript material in these areas has increased dramatically in recent years, and in 1998 it was decided to make these extraordinary texts (and those papers relevant to his time as Warden and then Master of the Mint) available to a broad readership. To that end, the Newton Project was formed in order to create both electronic and printed editions of Newton's theological, alchemical and administrative writings.

The magnitude of Isaac Newton's (1642-1727) accomplishments place him in the very first rank of scientists and mathematicians. However, although most early modern scientists have been honoured with comprehensive editions of their collected works, there is no similar tribute to Newton. There are excellent editions of his mathematical and scientific papers, but very few of his non-scientific writings have appeared in print. Accordingly, the Newton Project, based at Cambridge University and Imperial College, was formed in 1998 to produce both electronic and printed editions of Newton's theological, alchemical and Mint papers. These editions will shed light on the differences and connections between distinct areas of his research. For example, there are a number of links between different elements in Newton's work, such as theology and natural philosophy, and he himself thought that his scientific discoveries constituted evidence for the existence of an Omnipotent and mathematically adept Creator. On the other hand, he argued that certain aspects of his scientific approach were incompatible with his work in alchemy and theology. One could not, for example, prove religious truths as one might demonstrate propositions in Euclid, and the former would only be binding to those who believed that Christ was the Son of God.

Aside from any connection to his work in natural philosophy, his extraordinary theological and alchemical papers are unquestionably important in their own right. Composed over the whole of his career, many of his theological papers are strikingly original compositions that reveal the full extent of his passionate anti-trinitarian and anti-Catholic views. Nevertheless, although he performed a number of innovative alchemical experiments and wrote broadly on the subject, many of his notes in this area are transcripts and collations of previous authors. In almost every aspect of his alchemical and theological pursuits, Newton drew from vast amounts of both past and contemporary writings, while to a large extent he should be seen as engaging with contemporary religious, political and intellectual issues. Accordingly, the Newton Project will also place these writings in their relevant contexts. A complete edition of Newton's works will thus add substantially both to our understanding of his life and work, and more generally to the intellectual history of the early modern period."

The final aim of the project is "to make available on-line transcripts of all of Newton's writings, including notes and marginalia, along with scholarly editorial apparatus and translations of non-English text. Initially, we will place on-line basic transcripts of Newton's most significant theological treatises, beginning with the few texts that have already appeared in print. Following this, we intend to edit the alchemical and then the Mint papers in the same way, following the highest standards of contemporary editorial practice. In addition to the electronic edition, we also intend to produce a printed edition that will make the same material available in a different and – as it stands at present – more conventional format. The duration of the project is expected to be between fifteen and twenty years, depending on funding. From January 2000, the Newton Project has been the beneficiary of a substantial award from the Arts and Humanities Research Boards. This sum will support the work of two editors, based at Imperial College, for a period of five years."

Marco Beretta (Università di Bologna) presented the preliminary results of the project Panopticon Lavoisier. The project aims at creating a virtual museum of the collections of the French chemist Antoine Laurent Lavoisier (1743-1794) scattered throughout the world. The first step of this project is the digital acquisition of the manuscripts (through direct scanning) of the most important manuscripts of the French chemist kept at the Archives de l'Académie des Sciences de Paris. The Archives preserve some 5000 manuscript documents of Lavoisier for a total of about 35.000 folio.

Out of these the laboratory notebooks, the carnets the voyage and the most important unpublished manuscripts will be scanned. The total of folios which will be scanned is estimated in 10.000 digital images. The images of the manuscript documents will be linked to an existing data-base of the Lavoisier collection and they will be published on the www. The data-base catalogue, *Pinakes*, may be consulted at the web site <http://moro.imss.fi.it/lavoisier/>.

The collection of Lavoisier's instruments (about 450 items) at the Musée des Arts et Métiers represents the largest survived laboratory of a scientist of the 18<sup>th</sup> century and it is certainly the richest chemical laboratory of the period. A detailed database inventory of Lavoisier's instruments is already available . Through a detailed study of some important instruments and by linking the instrument to its manuscript or printed description, in the database it will be possible to evaluate both their use and their actual accuracy.

The contents of catalogue of Lavoisier's library is going to be completed by year 2001 end. Among the titles already available on the website, one treatise by Tachenius has been entirely scanned. In collaboration with the Médiathèque d'Histoire des sciences (Cité des sciences et de l'Industrie, Paris) and the Bibliothèque de l'Institut (Paris), some more titles coming from Lavoisier's library and recently identified in the old stack of the Bibliothèque de l'Institut, will be also scanned.

The project provides a digitalization of Lavoisier's *Oeuvres* (Paris, 1862-1893, 6 vols., 4500 pages) and in the nearest future the digital text of the first three volume will be put at disposal of the remote users.

Lavoisier's bibliography of Lavoisier (1768-2001) and of secondary literature from 1794 to present day is also available in digital format within the database.

Lavoisier's iconography has also been made available.

The target of the project Panopticon Lavoisier is to create a virtual itinerary in which both the scholars and common users may render visible on two levels the importance of this new means of enhancing a special scientific collection:

In the first place, by making accessible to a large number of users the unique but little known treasures of Lavoisier's scientific collections, will underline the economic potential entailed in the creation of digital scientific museums and archives.

By making aware the students and the scholars in humanities of the usefulness and potentials of the application of new technologies to the cultural heritage will offer new perspectives in their profession and will promote the informatic education in fields which so far have been nearly untouched by the formidable progress made in electronic technology.

Pietro Corsi (Université de la Sorbonne, Paris) ha presented a project entitled *Œuvres et rayonnement de Jean-Baptiste Lamarck* ([www.lamarck.net](http://www.lamarck.net)). This site, promoted by the Centre de recherche en histoire de science et des techniques de la Cité des Sciences et de l'Industrie in collaboration with the Centre Alexandre Koyré and the Muséum d'Histoire Naturelle (Paris) has been conceived in order to make available to remote users a rich variety of documents directly and indirectly connected with the life and work of the French naturalist Jean Baptiste Lamarck. The site, which is presently in progress of expansion, offers the digital texts of all the printed works by Lamarck. The texts may be browsed either like a common book (page by page) or by searching single words. The digital reproduction of Lamarck's work, which includes also his contribution to Encyclopaedias and Journals, faithfully reproduce the numbering of the original pages of the printed work, thus making it very easy to compare the digital with the original editions. In addition to the digital edition of Lamarck's work, now close to be completed, the site offers a biography of Lamarck and the electronic edition of a manuscript, recently discovered by Pietro Corsi, with a list of Lamarck's courses at the Muséum d'histoire naturelle and pupils. By exploiting the potential of database technology, an edition of the manuscript has allowed to order and classify the population of Lamarck's pupils and to explore through different itineraries of access the structure of one of the most important courses in natural history in Europe of the period 1795-1820. The site will also offers the bibliography on Lamarck and other bibliographic and documentary information concerning the French naturalist. An important quality of this project is the involvement of secondary schools. Corsi in fact has pointed out that in order to identify some of Lamarck's pupils coming from the provinces a questionnaire has been sent to French secondary schools and Lycées out to encourage research on the history of science in local and peripheral areas of France. This successful experiments shows among other things the educational potentials of new technology.

Karl Grandin (Center for History of Science at the Royal Swedish Academy of Sciences – Stockholm <http://www.cfvh.kva.se/>) has presented some projects in which the Center is presently involved. The first is a European project which aims at the enhancement of cultural heritage within regional networks (RegNet : <http://www.regnet.org/>) and it involves 28 institutions throughout Europe. A second project, in progress, aims at cataloguing the old collection of books of the Academy. Most of these books are old material and their catalogue is both time and cost consuming.

The Center, by adopting an existing project promoted by the University Library of Göteborg (<http://ipac.ub.gu.se/katalog1957/>), has decided to scan the existing card catalogue. A third project to be presented was the Linnean link (<http://www.nhm.ac.uk/library/linn/>). "Carl Linnaeus is one of the great scientific figures of the 18th century. His works and those influenced by him are of great historical significance and continuing scientific relevance. The Linnaeus Link project - a collaboration between The Natural History Museum and a number of international partners - aims to improve access to these key resources by the creation of high quality digital records. This will eventually lead to an on-line union catalogue of Linnaean material. The libraries of many older taxonomic institutions possess major works by Linnaeus. However, there are many more specialised collections devoted to the work of Linnaeus and his students. Many of these are important to taxonomic, historical and bibliographical research. For example, the Linnean Society of London owns Linnaeus' personal library of books, manuscripts and correspondence, as well as his specimen collections - plants, fish, insects and shells.

Many of these collections remain inaccessible, except to visitors, as very little of the material has been catalogued electronically. It is the aim of this project to extend, enhance and standardise the cataloguing of major Linnaean collections so that they can be brought together, in one interface, on the World-Wide Web. The current project was born of discussions in 1996 between Tomas Anfalt (Linnaeus Correspondence Project), Gina Douglas (Linnean Society of London) and Carol Gokce (The Natural History Museum).. It is hoped to expand the Project Group to include all institutions with major Linnaean holdings."

Finally the Project on the documentary history of contemporary Swedish Astronomy (1942-2001) was presented. As on this theme no classified archive exists, the approach to the sources has been the systematic use of interviews and of the overviews scientists themselves have published on their own past activities. Among the problems raised by this kind of approach is how to examine critically the sources considered.

Eve Netchine (Bibliothèque Nationale de France) presented the scientific section of Gallica ([www.bnf.fr](http://www.bnf.fr)). Netchine pointed out the relevance of scientific and technological literature within the project of digitalization of Gallica and the usefulness of this means in order to enhance sources which has been usually neglected. If a user asks today about the consistency of the scientific collection kept at the Bibliothèque Nationale de France he/she

would have some difficulties to find any curators knowing a precise answer. While a curator of the old collection would certainly be knowledgeable about Marcel Proust's manuscript version of the *La recherche*, he/she would be less interested in deepening an enquiry on the laboratory notebooks of Madame Curie. Thanks to the introduction of the digital library Gallica this situation is rapidly changing and the scientific collections are made available to the users. The scientific texts so far digitalized are about 10% of the total (ca. 18.000 works) and they are represented in the following disciplinary fields:

Main Topics	Ca. number of texts digitalized in Gallica
General	500
Botany	1900
Chemistry	1200
Mathematics	1200
Physics	1100
Zoology	900
Biology	600
Astronomy	500
Geology	400

Netchine presented the way the users may have access to Gallica and navigate in the database.

Finally the Catalogue Collectif des Bibliothèques de France ([www.ccr.bnf.fr](http://www.ccr.bnf.fr)) was presented as an example of a general information service which can provide extremely useful bibliographic information on rare books and offprints.

Andrea Scotti (Istituto e Museo di Storia della Scienza, Florence) and Daniele Nuzzo (Florence) have presented the structure of a relational data-base Pinakes ([www.pinakes.org](http://www.pinakes.org)). "Pinakes is a non-commercial tool that aims to offer a renewed historiographic approach to the classification of the scientific heritage. Thanks to the integration of different types of objects, such as instruments, manuscripts, texts, iconography etc. Pinakes offers the chance of transforming the traditional approach to the primary sources of the history of science into a sort of archaeology of scientific knowledge. In order to achieve this ambitious project it was necessary to design a model of data-base able to bring different classes of objects and items into one environment.

Thus, Pinakes offers both the possibility to develop a specific research within a restricted disciplinary target and the possibility to carry out large classification of libraries, archives and museums. Pinakes has been thought as a database capable of hosting different levels of data structuring. On the basis of the choice of the target, the user might be able to manage data from a very specific level to a more general description of the items classified.

Pinakes is a relational database and is divided into three different bodies:

- **PinakesMain (Main engine and general input interface)**
- **PinakesText (Text retrieval and structuring engine)**
- **PinakesWeb (The remote access interface – Web interface)**

Within PinakesMain are enclosed the following archives:

- a standardised **Person name list** based on the international naming rules for physical Persons denomination;
- a standardised **Place name list** based on international naming rules for geopolitical denomination;
- a standardised **Institution name list** based on international naming rules for Institution modern and historical denomination).

These archives grow within the different projects in which Pinakes is applied. “

An example of the application of Pinakes to one special collection was the presentation of Parnassus Scientiarum (<http://moro.imss.fi.it/waller>) a catalogue of about 2000 scientific manuscript documents dating from 1400 to 1950 made available in digital format.

Kostas Gavroglu (University of Athens) presented the project Hellinomnimon (<http://sat1.space.noa.gr/hellinomnimon/>) which is a digital library which consists of all the philosophical and scientific manuscripts written in Greek from 1600 to 1821. “The first phase of Hellinomnimon has been completed from September 1995 to September 1997. This phase involved the process of digitizing all the books. The second phase involves the analogous processes for the manuscripts and is projected to be completed by 2002. The totality of the philosophical and scientific corpus written in the Greek language from

1600 to 1821 consists of two large categories. The first category consists of the books which had been published in Vienna, Venice, Paris, Constantinople, and Leipzig. These comprise 204 volumes of 53,000 pages in total. The second category contains the manuscripts --those written by the respective authors or the copies of extant originals. These make up a volume of over 500,000 pages. Among other places, these manuscripts are to be found in the various National and private libraries in Greece, France and Russia, in the Library of the Patriarchates in Istanbul, Jerusalem and Alexandria, in the Bodleian Library in Oxford, in various libraries of Turkey as well as in libraries of monasteries in Greece, Rumania, Bulgaria and Russia."

Walter Tega (Musei di Palazzo Poggi – Università di Bologna) presented the composition of the newly opened Musei di Palazzo Poggi, the site of the museum of the University of Bologna. Most of the collection adorning this Renaissance palace are scientific and they include an ample selection of Ulisse Aldrovandi's naturalistic museum, the scientific collectionism in Bologna during the 17<sup>th</sup> and 18<sup>th</sup> century, the collection of Ferdinando Marsili (the founder of the Istituto delle Scienze of Bologna), the astronomical observatory, the collection of anatomical waxes, chemical, physical and optical instruments coming from the Istituto delle Scienze and from later collections and an ample section of military architecture. This museum, which was opened at the end of year 2000, has now the aim of creating not only a permanent exhibit of the Bolognese scientific heritage, but also to encourage and coordinate scholarly research on the collections. A most recent example of this ambition is testified to in the preliminary catalogue of Ulisse Aldrovandi's manuscripts and in the digital edition of his beautiful painted naturalistic plates. These are available from the website at the address [www.filosofia.unibo.it/aldrovandi](http://www.filosofia.unibo.it/aldrovandi).

The final round table, co-ordinated by Raffaella Simili (Università di Bologna), provided commentaries and new insights and perspectives on the general theme "The European scientific heritage. Perspectives on education, research and enhancement."

Paolo Galluzzi presented the digital archives published from the website of the Istituto e Museo di Storia della Scienza of Florence and pointed out how thanks to multimedia tools it is possible to enrich the pedagogical vocation of science museums. Galluzzi has also emphasised how the traditional professional identity of historians of science, librarians, and museum curators is challenged by the impact of the new technology. This theme was



taken up by John Heilbron (Oxford) who has pointed out that it is about time to take the technology for granted and to introduce a new level of discussion: to the huge and ever growing documentary resources made available to scholars from the web does not correspond a professional and scientific recognition to those involved in these kind of enterprise. While a traditional printed edition of a work of a scientists or a publication of a catalogue of scientific instruments are fully recognised as scientific titles, the on-line publication and the web resources are still to be qualified as scientific works. Tore Frängsmyr (Uppsala University) has also emphasised the importance to develop the most conducive and scientific material conditions to make projects such as those presented during the workshop more numerous and thus make available to scholars the documentary sources related to the history of science and technology. Another issue related to the question of recognition, which has been raise at the round table, was that of copyright of digital resources (Galluzzi and Iliffe) and the difficulties to find uniform policies making the data accessible while retaining the properties right.

It was pointed out (Heilbron) that scientists should have been involved in this process of enhancement as their contribution is often of crucial importance in the evaluation of more recent instruments and documentary resources.

The enthusiasm for the use of new technology was expressed by Steven De Clerq (Utrecht University) who pointed out how in the Netherlands has become possible to co-ordinate collaborative projects in the enhancement of scientific heritage where general description of scientific collections can be finally become available thanks to the use of some general accepted rules of classification. Dominique Ferriot (Conservatoire des art et métiers – Paris) has showed, through a video, the steps which brought to renovation the Musée des art et métiers and the problems, both practical and scientific, involved in the preservation of huge collections of instruments such as that hosted in the Musée des art et métiers in Paris.

**FINAL PROGRAMME**

**Friday 8 June**

09h00 - 13h00

- ♦ **Professor Antonio Carile**  
Dean, Facoltà Conservazione dei Beni Culturali, Università di Bologna
- ♦ **Professor Alberto Gallo**  
Director, Dipartimento di studi storici e sociali, Università di Bologna  
*Welcoming address*
- ♦ **Professor Raeffella Simili**  
ESF Standing Committee for the Humanities (SCH)  
*Introduction to the European Science Foundation*
- ♦ **José Ramón Bertomeu Sánchez and Antonio Garcia Belmar:**  
*University collections of scientific instruments: historical sources, didactic tools and museographic objects*
- ♦ **Jim Bennett:**  
*The Epact Project*
- ♦ **Mara Miniati:**  
*From SIC to STS: a standard for cataloguing scientific instruments*
- ♦ **Svante Lindqvist:**  
*The Nobel Museum*

LUNCH BREAK

15h30 - 18h30

- ♦ **Irina Gouzevitch and Boris Kozlov:**  
*The Archives of the Academia of Sciences of Russia (1725-2000)  
in history and today: a European patrimony to enhance*
- ♦ **Ulf Hashagen:**  
*The scientific heritage in Germany*

MEETING ADJOURNS

**Saturday 9 June**

09h30 - 13h00

- ♦ **Rob Iliffe and Scott Mandelbrote:**  
*Editing Newton's unpublished papers from the salesroom to the internet*
- ♦ **Marco Beretta:**  
*Towards an archaeology of scientific endeavour.  
The case of Lavoisier*
- ♦ **Pietro Corsi:**  
*The Lamarck project*
- ♦ **Karl Grandin:**  
*Documenting Swedish Science: physics, astronomy and oral history*

LUNCH BREAK

15h00 - 17h00

- ♦ **Eve Netchine:**  
*New access to scientific manuscripts and early printed collections:  
computerisation (CCFR), new descriptive catalogues and digitisation of  
primary resource material (Gallica) at the Bibliothèque Nationale de  
France*
- ♦ **Andrea Scotti and Daniele Nuzzo:**  
*Pinakes: a modeling environment for scientific heritage database  
applications*
- ♦ **Kostas Gavrolgu:**  
*Hellimonimon. A digital library of scientific and philosophical sources*
- ♦ **Walter Tega:**  
*The Musei di Palazzo Poggi in Bologna*

17h15 - 18h30

- ♦ **Round Table**  
*Chair: Raffaella Simili*  
*Participants: Steven de Clercq, Dominique Ferriot, Tore Frängsmyr, Paolo Galluzzi and John Heilbron.*  
*The European scientific heritage.  
Perspectives on education, research and enhancement.*

MEETING CLOSES

**Final List of Participants:**

Convenor:

**Marco Beretta** (*Convenor*)  
Via Ville 43  
510030 Serravalle P.se (PT)  
Italy  
Fax: +39 055 288257  
Email: [beretta@philo.unibo.it](mailto:beretta@philo.unibo.it)

ESF/SCH representative:

**Raffaella Simili**  
University of Bologna  
Department of Philosophy  
Via Zamboni 38  
40126 Bologna  
Italy  
Email: [simili@philo.unibo.it](mailto:simili@philo.unibo.it)

Participants:

**Jim Bennet**  
Museum of History of Science  
Broad street  
Oxford OX1 3AZ  
United Kingdom  
Email: [jim.bennett@mhs.ox.ac.uk](mailto:jim.bennett@mhs.ox.ac.uk)

**Pietro Corsi**  
Blvd. Richard Lenoir  
75011 Paris  
France  
Email: [pcorsi@dada.it](mailto:pcorsi@dada.it)

**Steven W.G. de Clercq**  
Utrecht University, senior consultant academic heritage  
c/o Straatweg 17  
3603 CV Maarssen  
The Netherlands  
Email: [s.w.g.declercq@pobox.uu.nl](mailto:s.w.g.declercq@pobox.uu.nl)

**Dominique Ferriot**  
Musée des arts et métiers – CNAM  
292, rue St. Martin  
75141 Paris Cedex 03  
France  
Email: [ferriot@cnam.fr](mailto:ferriot@cnam.fr)

**Tore Frängsmyr**

Office for History of Science  
Box 256,  
751 05 Uppsala  
Sweden  
E-mail: [Tore.Frangsmyr@idehist.uu.se](mailto:Tore.Frangsmyr@idehist.uu.se)

**Antonio García Belmar**

Departamento de Salud Pública  
Universidad de Alicante  
Carretera San Vicente del Raspeig s/n  
03690 San Vicente del Raspeig - Alicante  
Spain  
Email: antonio.garcia@uv.es

**Paolo Galluzzi**

Istituto & Museo di Storia della Scienza  
Piazza dei Giudici 1  
50122 Firenze  
Italy  
Email: galluzzi@imss.galileo.firenze.it

**Kostas Gavroglu**

Department of History and Philosophy of Science,  
University of Athens  
John Kennedy 37,  
Ilisia  
161-21 Athens  
Greece  
Email: kgavro@cc.uoa.gr

**Irina Gouzevitch**

Centre A. Koyré  
Museum National d'Histoire Naturelle  
Pavillon Chevreul  
57 rue Cuvier  
75005, Paris  
France  
Email: gouzevit@alize.msh-paris.fr

**Karl Grandin**

Centrum för vetenskapshistoria/Center for History of Science  
Kungl. Vetenskapsakademien/The Royal Swedish Academy of Sciences  
Box 50005  
104 05 Stockholm  
Sweden  
E-mail: karlg@kva.se

**Ulf Hashagen**

Deutsches Museum  
Forschungsinstitut  
80306 München  
Germany  
Email: u.hashagen@deutsches-museum.de

**John L. Heilbron**

April House  
Shilton  
Burford OX18 4AB  
United Kingdom  
john.heilbron@dial.appleinter.net

**Rob Iliffe**

Imperial College  
Centre for History of Science, Technology and Medicine  
Sherfield Building  
London DW7 2Z  
United Kingdom  
Email: r.iliffe@ic.ac.uk

**Svante Lindqvist**

The Nobel Museum  
P.O. Box 2245  
103 16 Stockholm  
Sweden  
Email: svante.lindqvist@nobel.se

**Scott Madenlbrote.**

Peterhouse  
Trumpington Street  
Cambridge CB2 1RD  
United Kingdom  
E-mail: scott.mandelbrote@all-souls.oxford.ac.uk

**Mara Miniati**

Istituto & Museo di Storia della Scienza  
Piazza dei Giudici 1  
50122 Firenze  
Italy  
Email: mara@imss.galileo.firenze.it

**Eve Netchine**

Bibliothèque Nationale de France  
Inventaire rétrospectif / T4-N4  
Quai François Mauriac  
75706 Paris Cedex 13  
France  
Fax: +33 1 53 79 54 60

**Daniele Nuzzo**

Via Mannelli 81  
50136 Firenze  
Italy  
Email: [daniele.nuzzo@pinakes.org](mailto:daniele.nuzzo@pinakes.org)

**Andrea Scotti**

Istituto & Museo di Storia della Scienza  
Piazza dei Giudici 1  
50122 Firenze  
Italy  
e-mail: [scottian@imss.galileo.firenze.it](mailto:scottian@imss.galileo.firenze.it)

**Walter Tega**

Facoltà di lettere e filosofia  
Università di Bologna  
Via Zamboni 38  
40126 Bologna  
Italy  
Email: [tega@philo.unibo.it](mailto:tega@philo.unibo.it)

Coordinating team:

1. **Marco CIARDI**
2. **Miriam FOCACCIA**
3. **Ombretta LACCHINI** (*Admin. Secretary*)  
Università degli Studi di Bologna  
Dipartimento di Filosofia  
Via Zamboni 38  
41026 Bologna  
Italy  
Tel: +39 051 2098428  
Fax: +39 051 2098355  
Email: [ombretta@philo.unibo.it](mailto:ombretta@philo.unibo.it)

in addition to the invited participants, the workshop was attended by a dozen of colleagues from the Ravenna Faculty of Cultural Heritage and the Department of Philosophy of the University of Bologna. A number of museum curators, librarians and archivists also participated. Finally, some 20 undergraduate and graduate students from both Bologna and Ravenna took part in the conference. The conference was publicised with posters and leaflets (with circulation to over 1500 addresses).